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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/678,990	10/04/2000	Henry Lukas	655.00809	4910

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04/09/2003

WOOD, PHILLIPS, VAN SANTEN, CLARK & MORTIMER
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CHICAGO, IL 60661

EXAMINER

PATEL, NIHIR B

ART UNIT

PAPER NUMBER

3743

DATE MAILED: 04/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/678,990

Applicant(s)

LUKAS ET AL.

Examiner

Nihir Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 20 is/are rejected.
- 7) ☒ Claim(s) 18 and 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of election of species in Paper No. 6 is acknowledged. The traversal is on the ground(s) that the figures do not represent patentably distinct species. This is not found persuasive because figures 1 and 2, figures 3 and 4, and figure 5 are different species. Figures 1 and 2 have an additional tube run 21, and figure 5 uses a baffle.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 3, 7, 9, 11, 12, 16, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanada US Patent No. 5,957,193 in view of van Heel US Patent No. 4,270,523. Referring to claims 1, 2, 3, 11, 12, and 20, Kanada discloses the applicant invention with the exception of laying out the tube runs in an equilateral polygonal pattern.

van Heel discloses a heat storage apparatus and heat exchanger element for use therein that does lay out the tube runs in an equilateral polygonal pattern (see figure 3). It is obvious to one in the ordinary skill of the art to lay out the tube runs in an equilateral polygonal pattern in Kanada's invention in order to reduce the size of the storage tank and to increase the heat transfer rate.

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Referring to claim 7, Kanada discloses the applicant's invention as claimed with the exception of providing tube runs that have six contact points with other runs or the salt case.

van Heel discloses a heat storage apparatus and heat exchanger element for use therein that does provide tube runs that have six contact points with other runs or salt case (see figure 3). It is obvious to one in the ordinary skill of the art to have tube runs that have six contact points with other runs or the salt case in Kanada's invention in order to reduce the size of the storage tank and to increase the heat transfer rate.

Referring to claims 9 and 15, Kanada discloses the applicant's invention as claimed with the exception of providing contact points that are angularly spaced by about 60 degrees.

van Heel discloses a heat storage apparatus and heat exchanger element for use therein that does provide contact points that are angularly spaced by about 60 degrees (see figure 3). It is obvious to one in the ordinary skill of the art to provide tube runs that have contact points that are angularly spaced by about 60 degrees in Kanada's invention in order to reduce the size of the storage tank and to increase the heat transfer rate.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanada US Patent No. 5,957,193 in view of Tsunekawa Patent No. JP363057855A.

Kanada discloses the applicant's invention as claimed with the exception of providing tubes that are brazed together to form a tube matrix and also brazed to the inner wall of the salt case in a pattern of brazed connections that are cyclically uniform and repetitive.

Tsunekawa discloses stirling engine that does provide tubes that are brazed together to form a tube matrix and also brazed to the inner wall of the salt case in a pattern of brazed connections that are cyclically uniform and repetitive (see figure 3). It is obvious to one in the

ordinary skill of the art to provide tubes that are brazed together to form a tube matrix and also brazed to the inner wall of the salt case in a pattern of brazed connections that are cyclically uniform and repetitive in Kanada's invention in order to increase the heat transfer rate.

Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over van Heel US Patent No. 4,270,523 as applied to claim 1 above, and further in view of Colvin et al. US Patent No. 4807,696.

van Heel discloses the applicant's invention as claimed with the exception of stating that the regular polygonal pattern is a closely packed hexagonal pattern.

Colvin discloses a thermal energy storage apparatus using encapsulated phase change material that does state that the regular polygonal pattern is a closely packed hexagonal pattern (see figure 5). It is obvious to one in the ordinary skill of the art that a regular polygonal pattern that is a closely packed hexagonal pattern be used in Kanada's invention in order to reduce the size of the storage system and to increase the heat transfer rate.

Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanada US Patent No. 5,957,193 in view of Boyer et al. US Patent No. 4,344,480.

Referring to claim 8, Kanada discloses the applicant's invention as claimed with the exception of providing a salt case that includes a plurality of parallel, elongated, inwardly directed spaced ribs, the runs having spaced centers, the spacing between the ribs being the same as the spacing between the centers, the runs on the matrix exterior being nested between two adjacent ribs and each having one of the contact points with each of the two adjacent ribs.

Boyer discloses a support for heat exchange tubes that does provide a case that includes a plurality of parallel, elongated, inwardly directed spaced ribs 28 (see figure 2), the runs having,

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spaced centers, the spacing between the ribs being the same as the spacing between the centers, the runs on the matrix exterior being nested between two adjacent ribs and each having one of the contact points with each of the two adjacent ribs (see figures 2 and 3). It is obvious to one in the ordinary skill of the art that a case that includes a plurality of parallel, elongated, inwardly directed spaced ribs, the runs having spaced centers, the spacing between the ribs being the same as the spacing between the centers, the runs on the matrix exterior being nested between two adjacent ribs and each having one of the contact points with each of the two adjacent ribs be used in Kanada's invention in order to reduce the size of the storage tank which will increase the heat transfer rate.

Referring to claim 17, Kanada discloses the applicant's invention as claimed with the exception of providing an outer jacket that comprises a plurality of strengthening ribs.

Boyer discloses a support for heat exchange tubes that does provide an outer jacket that comprises a plurality of strengthening ribs (see figures 2 and 3). It is obvious to one in the ordinary skill of the art to use an outer jacket that comprises a plurality of strengthening ribs in Kanada's invention in order to hold the tubes tightly together.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kanada US Patent No. 5,957,193 in view of Takahashi et al. US Patent No. 4,463,799.

Kanada discloses the applicant's invention as claimed with the exception of providing a baffle extending through the matrix between the runs; the inlet conduit being connected to the salt case on one side of the baffle, the outlet conduit being connected to the salt case on the other side of the baffle.

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Takahashi discloses a heat storage medium for latent heat thermal energy storage unit that does provide a baffle extending through the matrix between the runs; the inlet conduit being connected to the salt case on one side of the baffle, the outlet conduit being connected to the salt case on the other side of the baffle 3 (see figure 2). It is obvious to one in the ordinary skill of the art to provide a baffle extending through the matrix between the runs; the inlet conduit being connected to the salt case on one side of the baffle, the outlet conduit being connected to the salt case on the other side of the baffle in Kanada's invention in order to increase the heat transfer rate.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over van Heel US Patent No. 4,270,523 as applied to claim 1 above, and further in view of Boyer et al. US Patent No. 4,344,480.

Van Heel discloses the applicant's invention as claimed with the exception of providing a salt case that comprises a plurality of parallel, inwardly directed, spaced, elongated ribs on centers spaced a distance equal to the spacing between the centers of the runs; the runs on the exterior of the matrix being nested between corresponding ones of the ribs and engaging the ribs along their respective lengths.

Boyer discloses a support for heat exchanger tubes that does provide a case that comprises a plurality of parallel, inwardly directed, spaced, elongated ribs on centers spaced a distance equal to the spacing between the centers of the runs; the runs on the exterior of the matrix being nested between corresponding ones of the ribs and engaging the ribs along their respective lengths (see figures 2 and 3). It is obvious to one in the ordinary skill of the art that a case that comprises a plurality of parallel, inwardly directed, spaced, elongated ribs on centers

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spaced a distance equal to the spacing between the centers of the runs; the runs on the exterior of the matrix being nested between corresponding ones of the ribs and engaging the ribs along their respective lengths be used in van Heel's invention in order to increase the heat transfer rate.

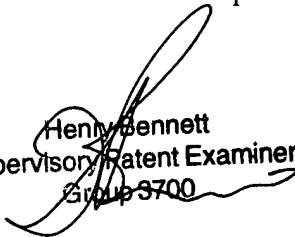
Allowable Subject Matter

3. Claims 18 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Nihir Patel whose telephone number is (703) 306-3463. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful the examiner supervisor Henry Bennett can be reached at (703) 308-0101.


Henry Bennett
Supervisory Patent Examiner
Group 3700

NP
April 4, 2003